

## THE GROUP OF GONIOBASIS CATENARIA

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*Goniobasis catenaria* (Say) and its close relatives are a source of solace to anyone who has turned to them after floundering about in the morass of the *Pleuroceridae*. Certain shell characters tend to be persistent throughout the group, even though sometimes they are dimmed. The operculum is distinctive, serving as a clue or to dissipate doubts. For the most part, there is little of the erratic variation which in other groups of the family is likely to be found in quite small colonies of a given species. Yet the group, for all this, has its own burden of synonyms, its share of confused history and its questions. Perhaps otherwise it might seem hardly to belong among the Pleurocerids.

Carinae are present and are strong at least upon the upper whorls. There are usually folds on the base. This is to say that even in a lot in which most whorls of the shells are smooth, as in some distributions of *G. porrecta* and *comalensis*, an individual or two will be found to have revolving ribs on the base. Color bands appear to be absent. The operculum is of the kind that has been called paleomelanian, the spiral lines being loosely coiled and well marked.

*Melania catenaria* Say (non *M. catenaria* Lea, 1840) was described in 1822 from small shells taken in "limestone springs, St. John's Berkley", South Carolina. Mr. William G. Mazyck has called my attention to an error of Tryon in making the locality a specific "Limestone Springs", and has sent me material from Eutaw Springs of the same region. These specimens, though larger than were Say's, agree very well with the description. The adults are not as carinate as are the familiar Florida forms, but the char-

acter is well developed in the young. Sculpture and operculum are the same.

Pilsbry (footnote THE NAUTILUS, IV, 1891, p. 124) makes the following synonymous with *catenaria*:

*M. sublirata* Conrad, 1850.      *G. hallenbecki* Lea, 1862.

*M. floridensis* Reeve, 1860.      *M. papillosa* Anthony, 1861.

*M. etowahensis* "Lea"      *G. downicana*, Lea, 1862.

Reeve, 1861.      *G. bentonensis* Lea, 1862.

He provisionally adds:      *G. couperi* Lea, 1862.

*M. boykiniana* Lea, 1840.

To the first names can be added *G. abbrevillensis* Lea, 1862, the types of which I have examined, *canbyi* Lea, 1862, and with definiteness *couperi*. Lea's figures of *canbyi*, *couperi* and *downicana* look as if the shells had been selected from the same lot. The specimens came to Lea from J. Postell of St. Simon's Island, close to the mouth of the Altamaha, who received them from "Mr. Couper, son of James Hamilton Couper, Esq., of Hopeton, near Darien," which, as in the case of St. Simon's Island, is in southeastern Georgia, and not near the Etowah River of North Georgia, to which the three species are credited. The mollusks are of the form that might be expected to occur in southern Georgia, near the Florida colonies, rather than in the north. It is possible that in Postell's time there was another Etowah River in the state, that kind of duplication of names being then far from uncommon.

*Melania cancellata* Say, 1829, may be a synonym of *catenaria* also. It came from St. John's River, Florida, and has not been taken by any recent collector, so far as I know. Say thought it was distinct because it was "of a much more elongated and attenuated form." It would seem that he had only one specimen. *M. postelli* Lea, 1858, is under similar suspicion, but as the types came from the Altamaha River and this stream contains the astonishing *Elliptio spinosus* Lea, it would appear probable that a Pleurocerid as distinctive in its own way might have evolved in the same environment. *M. curvicostata* "An-

thony" Reeve, 1861, if it is a good species which is doubtful, will stand upon having longitudinal ribs that are not crossed by revolving striae. The place of *densicostata* Reeve, 1861, is in the synonymy of *curvicostata*, as Tryon made it.

Shortly before his death, Dr. Ortmann sent me for examination some shells that he had taken in Greenville County, Va., in 1926. There were young as well as old specimens in the material, and I was able to recognize them as the juveniles of *M. dislocata* Ravenal, 1834, which had been known previously, I think, only by adult mollusks. They indicated plainly that *dislocata* is an outlier of the *catenaria* group, being both its most eastern and its most northern representative. *Goniobasis inclinans* Lea, 1862, is a narrow form of *catenaria* that appears to be constant, and deserving of recognition as a subspecies. The most definitely named locality for it that I have seen is Skywater Mineral Springs, Albany, Ga.; and it may be that the variety is confined to springs. That it occurs also at Tusculumbia, Ala., as Lea thought, is to be doubted. A third local race that is seemingly derived directly from *catenaria* is *G. vanhyningiana* Goodrich, 1921. It occurs in a creek below Seminole Springs, Lake County, Florida.

The "provisional" synonyms of *catenaria* of which Pilsbry speaks, *M. boykiniana* Lea, *G. hallenbeckii* Lea and *G. bentonensis* Lea, are members of a sub-group, it seems to me, and probably of later development than the rest, to judge by their extreme variability and the modified opercula of some of them. *Hallenbecki*, as Pilsbry notes, is only another name for *boykiniana*, and this name also supercedes *M. catenoides* Lea, 1842. All three occur in the Chattahoochee River at Columbus, Ga. I am not sure whether or not *bentonensis* ought to be discarded as well. Certain specimens so named that I have seen are smaller, less carinate and less granulate than *boykiniana*. Other species that belong to this sub-group are *G. albanyensis*

Lea, 1864; *gesneri* Lea, 1868, and perhaps *clenchi* Goodrich, 1924.

Retaining the essential characters of the *catenaria* species of the Coastal Plain are four species of East Tennessee, the leading term of which is *G. arachnoidea* Anthony, 1854. It occurs in great numbers in five or six counties, confining itself to creeks and springs. Mr. W. J. Clench of the Museum of Comparative Zoology, which has the Anthony collection, writes me that *M. intertexta* Anthony, 1860, is "the absolute synonym of *G. arachnoidea*. The type label reads 'Louden, Tenn.' " This is the place whence *arachnoidea* came. *M. strigosa* Lea, 1841, is a nearly smooth, attenuate species of apparently the same stock and more restricted distribution, the only locality for it that I know being a creek in Knox County. In *M. troostiana* Lea, 1841, the revolving striae upon the shell are intensified, the longitudinal folds are absent. The species occurs plentifully in Mossy Creek, Jefferson County, and in at least one spring in Monroe County. It is approached in the matter of obsolete folds by a form of *arachnoidea* living in a reservoir near Cleveland, Bradley County, which has discharges both to the Tennessee and the Alabama systems. I believe that *M. striatula* Lea, 1842, which replaced *M. striata* Lea, 1841, preoccupied, is only the young of *troostiana*. Looking in the U. S. National Museum for the "single specimen" from which *M. sulcosa* Lea was described, I failed to observe it, but did see three young *troostiana* that were so named by Lea. If they are truly *sulcosa*, then *sulcosa*, having been described two months earlier, will replace *troostiana*. Less obviously a member of the *catenaria* group is *G. porrecta*, Lea, 1863. It is possibly an offshoot of *arachnoidea*, modified by life in waters usually rather swift and probably colder than the average stream of East Tennessee. It was first taken by Captain S. S. Lyon in Gap Creek and spring at Cumberland Gap. I found it sparingly in the waters of the Gap spring as they come tumbling down the mountainside, but

in Gap Creek at Tyrell, three or four miles below, specimens could be gathered by the fistful. A synonym of *porrecta* is *G. vittatella* Lea, 1863.

Suggesting the *catenaria* of the Florida springs in miniature is the little *G. crenatella* Lea, 1863, of the Coosa River, Ala. It was described as from Uniontown, Ala., which was merely the home of the original collector, Dr. E. R. Schowalter. The species occurs in the middle reaches of the Coosa from Ten-Island Shoals, St. Clair County, to Higgin's Ferry, Chilton County, and in a letter to Dr. Walker, Herbert H. Smith once spoke of finding it in Big Will's Creek, Etowah County. The small *G. nassula* Conrad, 1834, of the Limestone Spring at Tuscumbia, Ala., also belongs to this group. Many specimens greatly resemble the common Florida forms. In the same spring at Tuscumbia are specimens of *nassula* that are wanting or nearly wanting in spiral sculpture. They were given the name of *G. thorntonii* by Lea. It should be in the synonymy. *G. edgariana* (Lea), which Tryon made synonymous with *nassula*, belongs to the group of *G. laqueata* (Say). Another Alabama locality for *nassula* is the big spring at Huntsville.

The oddest species of the group, from the geographical standpoint, is *Goniobasis comalensis* Pilsbry, 1890, of the eastern Texas streams. Between it and any other Pleurocerid, a great area intervenes. Perhaps it must be considered a relict species, going back to the age in which the Appalachian Plateau extended continuously into the southwest, the Pleuroceridae were much more widespread over North America, and the rain fell generously upon the country of the Great Plains and the Great Basin. A form of the springs of Comal County, Texas, was given the sub-specific name of *fontinalis* by Pilsbry and Ferriss in 1906.